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[57] **ABSTRACT**

A method and apparatus for determining a fluid condition adjacent an inner wall boundary of a fluid container is disclosed. A sonic pulse is applied to an outer wall boundary of the container wall and is reflected between an inner and the outer wall boundaries. The magnitude of the sonic pulse decreases each time it is reflected off of the inner wall boundary by an amount which varies as a function of the fluid condition adjacent the inner wall boundary. An electrical reflection pulse whose magnitude is representative of the instantaneous magnitude of the sonic pulse is generated each time the sonic pulse is reflected off of the outer wall boundary of the container. The electrical reflection pulses are integrated during an integration period so as to generate an integration output signal whose value varies as a function of the fluid condition within the container. The integration output signal is compared to a predetermined value to determine the fluid condition.

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### Related U.S. Application Data

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**[51] Int. Cl.<sup>2</sup> ..... G01F 23/00**

[52] U.S. Cl. .... 73/290 V; 367/908

[58] **Field of Search** ..... 73/290 V, 599, 600,  
73/194 A; 340/1 L

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**33 Claims, 30 Drawing Figures**

